

VERIFICATION REPORT FOR THE Greater New Bedford LFG Utilization Project

(VCS PROJECT 138)



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Summary:

The Greater New Bedford LFG Utilization Project (Project) consists of the collection and destruction of landfill gas that would otherwise have been released to the atmosphere. Through an active landfill gas collection system coupled with a backup open flare or four Caterpillar 3516 engines, capable of producing up to 3.6 MW of electricity, the Project results in the reduction of greenhouse gases through avoided emissions of methane (or CH₄).

In October of 2013, CommonWealth Resource Management Corporation (CRMC) contracted with Ruby Canyon Engineering (RCE) to perform the verification of the reporting period July 1, 2012 – June 30, 2013. RCE performed a site visit in November 2013 and subsequently completed a detailed document review of relevant Project information.

The purpose of the verification is to ensure that the emission reduction assertion submitted by CRMC is materially correct and free of errors and omissions, and that the Project meets all criteria requirements. Specifically, the Project was assessed against the requirements of the Clean Development Mechanism methodology ACM0001 (version 9.1), Verified Carbon Standard (Version 3.4), and the validated VCS Project Description (dated December 1, 2005 – with supplements dated December 2007 and December 23, 2008). The Project's Monitoring Report, including the Project's monitoring plan, was assessed in light of the above criteria documents.

During the verification process, requests for corrective action, additional documentation and clarification were issued. CRMC provided adequate response to all issues identified. RCE states, to a reasonable level of assurance, that the Project's GHG assertion of 98,863 metric tonnes of CO₂ equivalent emissions for the period of July 1, 2012 – June 30, 2013 is fairly stated.

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1 INTRODUCTION

RCE was contracted by CRMC to perform a third-party verification of the Project. The Project consists of the collection and destruction of landfill gas that would otherwise have been released to the atmosphere. The Project activity results in the reduction of greenhouse gases through avoided emissions of methane. This report covers the reporting period July 1, 2012 – June 30, 2013.

1.1 Objective

The objective of the verification is to ensure that the GHG emission assertion made by CRMC is materially correct and that the data provided is accurate, complete, and transparent. Additionally, RCE ensured that the Project is in conformance with the criteria as stated in Section 1.2.

1.2 Scope and Criteria

The scope of the Project includes the organizational boundaries of the Crapo Hill landfill and all components of the gas collection and control system. The GHG included in the scope of the project is CH₄.

RCE conducted the verification based upon the following criteria:

- Verified Carbon Standard version 3.4 (October 8, 2013),
- Clean Development Mechanism methodology ACM0001, Consolidated baseline and monitoring methodology for landfill gas project activities, Version 9.1,
- Validated VCS Project Description, December 1, 2005 – with supplements dated December 2007 and December 23, 2008, and
- ISO 14064-3 “Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions”.

Additionally, the Project’s reporting period-specific Monitoring Report, including monitoring plan, was reviewed during verification performance.

1.3 Level of assurance

RCE conducted the verification to a reasonable level of assurance.

Materiality was defined as errors, omissions, or discrepancies resulting in misstatement of greater than five percent of the Project’s GHG assertion. Additionally, qualitative non-conformances with criteria requirements were also considered material during the verification process.

1.4 Summary Description of the Project

The Project activity consists of the collection and destruction of landfill gas from Crapo Hill Landfill in Dartmouth, Massachusetts. The Project is located at latitude: 41° 43’28.12”N and longitude: 70° 59’04.82”W. The Project includes a landfill gas collection system which conveys landfill gas to four .9 MW Caterpillar 3516 engines or to a backup open flare. The flare did not operate during the reporting period therefore zero emission reductions are claimed from gas flaring.

Emission reductions are achieved by the Project through the collection and combustion of methane in the Caterpillar engines. The Project reduces the quantity of methane released to the atmosphere from the decomposition of waste in the landfill. In the absence of the Project, the majority of methane collected would have been vented to the atmosphere. Note that pre-Project, an active landfill gas collection and combustion system destroyed landfill gas from a small portion of the landfill in a flare. This initial system covered only a small extent of the landfill and methane that would have been collected in the initial system is deducted from final emission reduction calculations.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

RCE reviewed the validation report issued by First Environment, Inc. in December 2008.

2.2 Validation Findings

2.2.1 Gap Validation

Not applicable

2.2.2 Methodology Deviations

The following methodology deviation was identified during the current verification: Methane density and landfill gas flow volumes are stated at reference conditions of 20°C and 1atm. ACM0001 requires reference conditions of 0°C and 1atm.

This was not previously identified as a methodology deviation in the validated Project Description or past verification reports. RCE approved this deviation as it related to the methodology's monitoring and measurement requirements and did not impact the conservativeness of the GHG emission reduction quantification.

Section 4.1 contains additional methodology deviations that were previously validated.

2.2.3 Project Description Deviations

The following project description deviation was approved by RCE as the deviation did not impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario:

The validated Project Description states that methane content readings are to be taken on a continuous basis. During the period of 5/19/13 through 6/6/13, methane content readings were taken on a daily basis as methane content was determined through the use of a handheld portable gas analyzer rather than through continuous readings. This deviation does not impact applicability of the methodology, additionality or the appropriateness of the baseline scenario. The methodology requires a minimum of four quarterly methane content readings and, therefore, the Project far exceeds the methodology's requirements for methane measurement.

2.2.4 New Project Activity Instances

Not applicable

2.3 Validation Conclusion

One methodology deviation relating to methane density and landfill gas flow volume reference conditions and one project description deviation relating to methane content measurement was assessed during the verification period. The deviations were approved as they did not impact the applicability of the methodology, additionality, or applicability of the baseline scenario. The reference conditions employed do not impact conservativeness of the emission reductions

claimed. The approach used in the Project for methane content measurement well exceeds the methodology's requirements as continuous readings were used during the reporting period with the exception of the dates between 5/19/13 and 6/6/13 when daily readings were employed. All other specific requirements of the CDM methodology and the VCS program were met during the reporting period. CRMC provided adequate justification for the approved deviations and accurately described the deviations in the reporting period's Monitoring Report.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification process involved the following independent and objective activities:

- Select a Verification Team;
- Perform a Conflict of Interest Review;
- Review the validated Project Description;
- Review the Validation Report;
- Review the previous Verification Report;
- Review the current Monitoring Report (dated 27 Nov 2013);
- Develop a verification plan and risk-based sampling plan;
- Conduct a kick-off meeting with CRMC;
- Conduct a site visit to the Project;
- Review the Project information control systems and quality control procedures;
- Review the Project's emission reduction calculations;
- Issue corrective action, additional documentation, and clarification requests;
- Issue a verification report; and
- Conduct an exit meeting with CRMC.

The verification team was selected according to RCE's GHG Verification Policies & Procedures to ensure team members are qualified to perform verification activities pertaining to the Project. The Verification team consisted of the following individuals:

Lead Verifier: Eric Ripley

Verifier: Nina Pinette

Senior Internal Reviewer: Michael Cote

Prior to verification activities, RCE performed a Conflict of Interest Assessment to determine whether any potential conflicts exist with the project developer. No issues were discovered that would affect the impartiality or independence of the verification team.

A kick-off conference call was held with CRMC on November 1, 2013. The purpose of the kick-off conference call was to introduce the CRMC personnel and the RCE verification team, review the verification objectives and process, VCS requirements, and to confirm the verification schedule.

RCE developed a verification plan and sampling plan that were used throughout the verification of the Project. A sampling plan was created after reviewing the Project Monitoring Report, validated Project Description, and the VCS Standard (Version 3.4). A risk-assessment was performed based upon the criteria listed above and evidence provided to RCE by CRMC that pertained to the current reporting period.

The verification plan was used throughout the reporting period as a basis for assessing the completeness, consistency, accuracy and transparency of the Project's GHG emission reductions. RCE conducted a site visit at the Project location in Dartmouth, Massachusetts on November 19, 2013 as described in Section 3.4.

3.2 Document Review

RCE performed a risk-based analysis of the Project and document sampling in order to verify that the Project is in conformance with all criteria requirements and that the stated emission reductions are materially correct. The reviewed documents included (but were not limited to) the validated Project Description, the Project's validation report, previous verification reports, calculation spreadsheets, monitoring report and underlying raw data, calibration reports, environmental permits, and other source documents.

3.3 Interviews

RCE held numerous discussions with the following personnel throughout the verification process and during the site visit:

- Thomas Yeransian, Principal, CRMC

3.4 Site Inspections

RCE conducted a site visit at the Project location in Dartmouth, Massachusetts on November 19, 2013. The site visit activities included a physical inspection of the Project operations and a review of the Project's information control systems, data handling, QA/QC activities, and equipment calibration records. During the site visit, RCE discussed the day-to-day operation of equipment, data aggregation and compilation, environmental and regulatory compliance, and emission reduction quantification.

3.5 Resolution of Any Material Discrepancy

During the verification process, RCE issued requests for corrective action, clarification and additional documentation. These requests were documented through RCE's list of findings. CRMC sufficiently addressed all requests as highlighted below.

Corrective Action (CAR), Clarification (CL) and Additional Documentation Requests (AD)		
ID #	Action Item	Resolution
CAR 1.	Revise the Monitoring Report to indicate a methodology deviation for methane content and landfill gas flow readings using reference conditions of 20°C and 1atm rather than at 0°C and 1atm as required by ACM0001.	Monitoring report was revised.
CAR 2.	Revise the Monitoring Report to identify all previously approved methodology deviations: a. Baseline decline deviation b. SCADA system MMBTU calculation	Monitoring report was revised.

CAR 3.	Revise the Monitoring Report to indicate the methane content sampling conducted from 5/19/13 through 6/6/13 as methane readings were not conducted continuously during this period.	Monitoring report was revised.
CAR 4.	Apply the ACM0001-required lower bound of the 95% confidence interval to the non-continuous methane content readings taken between 5/19/13 and 6/6/13.	The lower bound of the 95% confidence interval was calculated and applied.
CAR 5.	Scale methane content by over-reporting errors found during the methane analyzer calibrations on 3/22/13 and 3/28/13.	Engine heat rate data and analysis of the mean methane concentration over the two weeks preceding and following the time periods in question were analyzed. The data show that inline methane content was consistent over this period and reflective of actual site operating conditions over the entire reporting period and therefore no adjustment was required.
CL 1.	Please clarify the Model and Serial number of the Omega Pressure Transducer used in the Project.	The Omega Pressure Transducer/Transmitter installed is Model PX2300-1DI, serial#5119832.
AD 1.	Provide the calibration report for the GEM analyzer used during the daily methane content readings from 5/19/13 through 6/6/13.	GEM analyzer calibration report was provided.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The Project start date is January 1, 2002 and the crediting period is for ten years ending on March 27, 2016. With the exception of the deviations noted in Sections 2.2.2, 2.2.3 and this section (below), RCE found that the Project was implemented in conformance with the validated Project Description. RCE confirmed that the Project continues to meet the requirements of the VCS Standard version 3.4.

CRMC is identified as the Project Proponent in the Monitoring Report. During verification activities, RCE confirmed that ownership of all emission reduction credits generated by the Project is transferred to Commonwealth New Bedford Energy LLC (CNBE - a wholly owned subsidiary of CRMC). As owner of the associated emission reduction credits and consistent with VCS policy, CNBE/CRMC provided an attestation to RCE stating that the emission reduction credits associated with the Project are only registered with the VCS program.

The data parameters that are recorded in order to calculate emission reductions are included and described in the monitoring report and monitoring plan. Landfill gas conveyed to the engines is monitored continuously using a Oripac Model 4150 orifice plate flow meter (serial 30154) coupled with an Omega Model PX2300-1DI differential pressure transmitter (serial#5119832). Landfill gas flow is recorded on hourly and daily intervals by a custom-built supervisory control and data acquisition system (SCADA). Field checks for flow meter accuracy are conducted on a monthly basis. All field checks during the reporting period were conducted on the appropriate interval and demonstrated that flow readings were highly accurate.

Methane concentration is measured continuously and recorded in the SCADA system on hourly and daily intervals. Methane concentration is monitored by a California Analytical NDIR gas analyzer (serial S07002). The Analyzer is field calibrated using calibration gas on a weekly basis. During the reporting period, two weekly calibration events showed over-reporting errors of greater than 5% (16.6% error on 3/22/13 and 7.9% error on 3/28/13). However, engine heat rate data and inline methane analyzer data was analyzed for a six week period (the two weeks in question plus two weeks preceding and following the periods in question) and demonstrated that the continuous readings were normal and reflective of site operating conditions through the entire reporting period. All calibrations were conducted on the appropriate interval and, with the exception of the two calibrations above, demonstrated results with acceptable accuracy. During the period of 5/19/13 through 6/6/13, methane content was sampled on a daily basis rather than on a continuous basis as the inline methane analyzer had been sent for factory maintenance. For this period, the ACM0001-required lower bound of the 95% confidence interval for non-continuous methane measurement was applied.

Operating hours for the engines are tracked via the SCADA system. Engine run hours are tracked for each engine separately.

The landfill is not subject to the New Source Performance Standards/Emissions Guidelines as it does not meet the relevant size requirements. Therefore, NMOC emission rate testing is not required for the landfill. Additionally, RCE reviewed the Project's air permit and the EPA ECHO database and found no instances of non-compliance.

In addition to the methodology deviation discussed in Section 2.2.2 and the project description deviation discussed in Section 2.2.3, RCE approved the following methodology deviations which had been assessed and approved by the Project's initial validation and verification body:

- Methane Gas Flow – The SCADA system calculates methane gas flow in units of million British thermal units (MMBtu). CRMC then converts the MMBtu value to methane gas flow in standard cubic feet. This method ultimately relies on direct measurement of landfill gas flow and methane content and results in a conservative quantification of total methane flow.
- Baseline Methane Destruction (MD_{BL}) – The quantity of methane destroyed in the baseline was validated to be based on methane destroyed in the pre-Project flare in 2001. A decline rate of 12.5% is applied to account for the natural decline in methane production from the portion of the landfill where the original gas collection system was located. This area of the landfill has actually declined at a more rapid rate than 12.5% per year and therefore the deviation is conservative.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

CRMC calculates the Project's emission reductions in accordance with the equations described in ACM0001. RCE sampled the Project's raw data collected via the SCADA system during the reporting period to ensure the accuracy of reported data and to ensure that there were no transcription errors between data sets. RCE reviewed the CRMC GHG assertion spreadsheet to ensure the accuracy of the formulas, emission factors applied, and functionality of the spreadsheet. RCE recalculated the emission reductions for the entire reporting period and found the GHG emission reduction calculations to be in conformance with ACM0001 and the validated PD, and free of material misstatement.

Methane destroyed ($MD_{\text{project},y}$) is determined through the use of continuous methane content ($w_{\text{CH}_4,y}$) (with the exception of the weeks from 5/19/13 through 6/6/13 when daily readings were applied), LFG flow volumes ($LFG_{\text{electricity},y}$), and methane density (D_{CH_4}). Flow volume and methane density are based on reference conditions of 68°F and 1atm. Methane destruction in the baseline (MD_{BL}) is determined by applying an annual decline rate of 12.5% to 2001 methane generation rates for the pre-project flare system. This value is subtracted from $MD_{\text{project},y}$. Total baseline emissions are determined by multiplying $MD_{\text{project},y}$ and methane GWP. For the period from 5/19/13 through 6/6/13 the ACM0001-required lower bound of the 95% confidence interval for methane samples was applied correctly. There are no sources of project emissions as the flare was not included in the reporting period and no electricity or fossil fuel is consumed in the Project.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

CRMC provided adequate documentation for the emission reduction calculations as well as its information control systems and data management processes. RCE reviewed the Project's Monitoring Report, instrumentation calibration reports, raw data, and all emission reduction calculations.

RCE found the information provided to be transparently documented and in accordance with the validated PD and requirements of the Clean Development Mechanism methodology ACM0001, Consolidated baseline and monitoring methodology for landfill gas project activities, Version 9.1.

4.4 Management and Operational System

RCE reviewed CRMC's information control systems that are used to collect Project-related data. During interviews with CRMC staff, data collection processes and operational systems used to collect and report data were reviewed. RCE found the systems employed result in adequate data collection and presentation with reliable controls. Quality assurance activities are present through data review techniques conducted by CRMC personnel.

RCE confirmed the Project's management and staff to be highly qualified and competent and determined that the GHG management system is sufficient to generate accurate and reliable raw data values.

5 VERIFICATION CONCLUSION

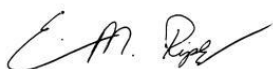
RCE conducted a risk-based analysis of the Greater New Bedford LFG Utilization Project including a strategic review of the Project data, documentation, and emission reduction calculations. RCE concludes to a reasonable level of assurance that the GHG assertion is free of material misstatement. The emission reductions resulting from avoided emissions of methane for the reporting period July 1, 2012 to June 30, 2013 can be considered in conformance with the:

- Verified Carbon Standard version 3.4 (October 8, 2013),
- Clean Development Mechanism methodology ACM0001, Consolidated baseline and monitoring methodology for landfill gas project activities, Version 9.1,
- Validated VCS Project Description, December 1, 2005 – with supplements dated December 2007 and December 23, 2008.

GHG Emission Reductions or Removals <i>July 1, 2012 – December 31, 2012</i>	tCO₂e
Baseline Emissions	51,915
Project Emissions	0
Leakage	0
Net GHG emission reductions or removals	51,915

GHG Emission Reductions or Removals <i>January 1, 2013 – June 30, 2013</i>	tCO₂e
Baseline Emissions	46,948
Project Emissions	0
Leakage	0
Net GHG emission reductions or removals	46,948

6 Lead Auditor Signature



Eric M. Ripley
Senior Environmental Specialist

7 Internal Reviewer Signature



Michael Cote
President and Senior Environmental Engineer